



# CARRYING CAPACITY

## TEACHER'S INSTRUCTIONS:

1) Hand out the page with the pictures on it (page 7) and allow students time to interpret it

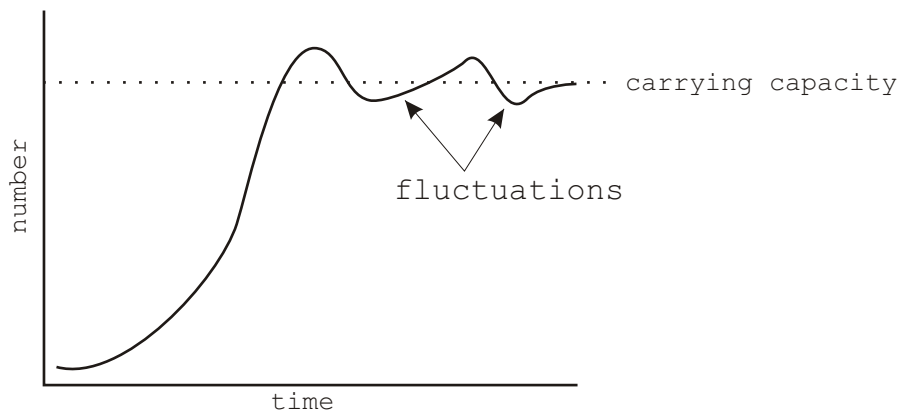
2) Based on the information conveyed in the pictures, have the students develop a definition for carrying capacity.

3) Based on their definition of carrying capacity, have the students determine the factors on which carrying capacity depends.

4) Provide each student with the rest of the handout (pages 2-4) Read through it together to have the students determine if their definition for carrying capacity and the factors on which it depends is appropriate.

5) Go over what the graph of a population at its carrying capacity looks like. Emphasize that a population fluctuates around it's carrying capacity.

6) Ensure that all students realize that the carrying capacity is the maximum number for a certain population and that populations do not need to be at their carrying capacities to be stable.



7) Have the students answer the questions in the handout.

8) Correct the questions (answer key on pages 5 and 6).



# CARRYING CAPACITY

## OBJECTIVES:

- be able to describe the carrying capacity of an ecosystem
- learn some definitions for carrying capacity

## KEY TERMS:

- typically: relating to or representing something
- ecosystem: a system of interacting organisms and their non-living environment
- equilibrium: stable, balanced or unchanging system
- fluctuate: to rise and fall as if in waves

## TASKS:

- look at the carrying capacity picture called "The Full Bucket"
- interpret it the best you can and create your own definition of carrying capacity
- determine the factors on which carrying capacity depends
- determine if your definition for carrying capacity is appropriate
- read the notes and answer the questions on pages 4 and 5





# CARRYING CAPACITY

## NOTES:

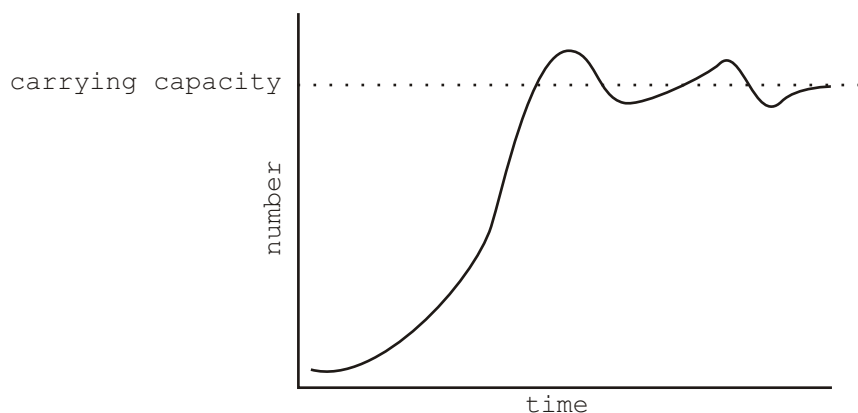
Carrying capacity is typically expressed as the number of animals of a certain type which can be supported in an ecosystem. Carrying capacity may be seen as an equilibrium or balance. However, the carrying capacity for many species is always changing due to various factors.

The carrying capacity of an ecosystem depends on three factors:

- 1) the amount of resources available in the ecosystem
- 2) the size of the population
- 3) the amount of resources each individual is consuming

Carrying capacity can also have a broader meaning. It can be defined as the number of living things (plants and animals) any area of land or water can support at any one time. Different organisms will have different carrying capacities in the same area. Thus, the carrying capacity of an ecosystem affects everything that lives in it.

The populations of most living things tend to fluctuate naturally around a certain level. That level is the carrying capacity. The following is a graph of a population at the carrying capacity of its ecosystem.





# **CARRYING CAPACITY**

## **QUESTIONS:** (20)

1) Write your own definition of carrying capacity. (2)

2) On what does a carrying capacity depend? (3)

3) Can you think of other factors that may affect a carrying capacity? (2)

4) Refer to the following statement when answering the next questions. (4)

"The carrying capacity of this lake equals 150 minnows."

a) Can less than 150 minnows live in this lake?

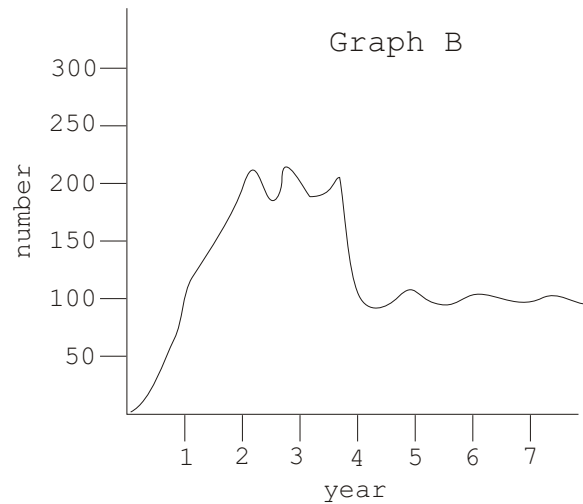
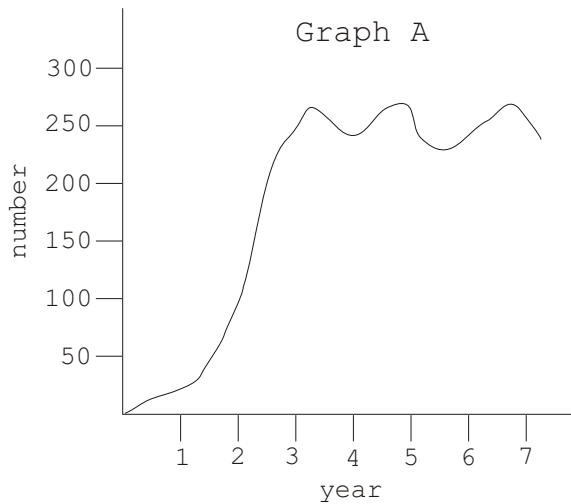
b) Can more than 150 minnows live in this lake?

c) Let's say that there are 140 minnows in this lake when the amount of resources in this lake decreases and the carrying capacity drops from 150 to 100 minnows. What will happen to this minnow population? Why will this happen?



# CARRYING CAPACITY

5) Refer to the following graphs for the next set of questions. (9)



FOR GRAPH A:

- What is the carrying capacity (approx.)?
- Approximately during which year did this population reach the carrying capacity of its ecosystem?
- About how many years did it stay at the carrying capacity?

FOR GRAPH B:

- What are the carrying capacities of this graph?
- How many years did this population spend at the first carrying capacity?
- During which year did it reach the next carrying capacity?
- Which carrying capacity is more stable? Why do you think so?



# CARRYING CAPACITY

## **ANSWER KEY:** (20)

1) Write your own definition of carrying capacity. (2)

**Answers will vary.**

2) On what does a carrying capacity depend? (3)

**Carrying capacity depends on the amount of resources available, the size of the population and the amount of resources each individual is consuming.**

3) Can you think of other factors that may affect a carrying capacity? (2)

**Answers may vary. Some examples include: natural disasters, human activities, weather, temperature, etc.**

4) Refer to the following statement when answering the next questions. (4)

"The carrying capacity of this lake equals 150 minnows."

a) Can less than 150 minnows live in this lake? **Yes**

b) Can more than 150 minnows live in this lake? **No**

c) Let's say that there are 140 minnows in this lake when the amount of resources in this lake decreases and the carrying capacity drops from 150 to 100 minnows. What will happen to this minnow population? Why will this happen?

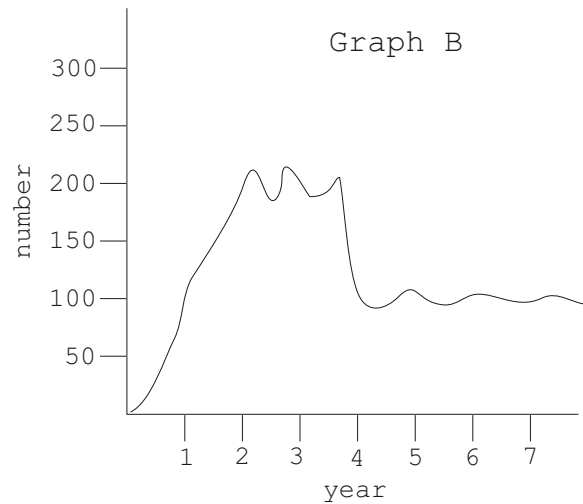
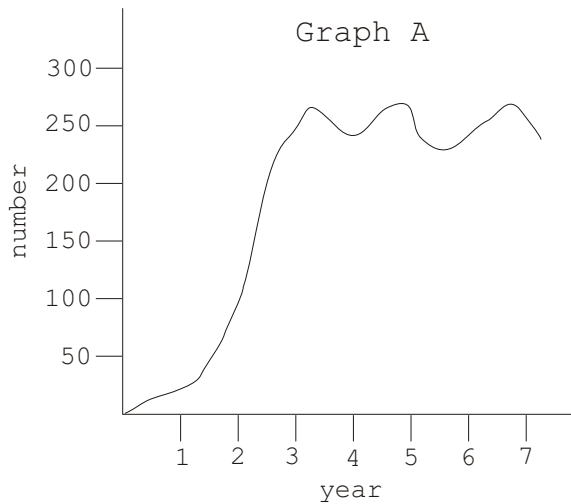
**This minnow population will decrease to at least 100 minnows. This will happen because the carrying capacity has decreased due to one of the following factors: fewer resources available or a larger population.**





# CARRYING CAPACITY

5) Refer to the following graphs for the next set of questions (9).



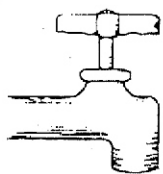
FOR GRAPH A:

- a) What is the carrying capacity (approx.)? **250**
- b) Approximately during which year did this population reach the carrying capacity of its ecosystem? **year 3**
- c) About how many years did it stay at the carrying capacity? **4**

FOR GRAPH B:

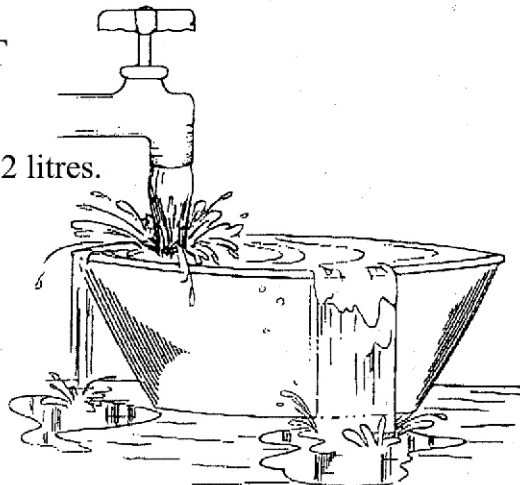
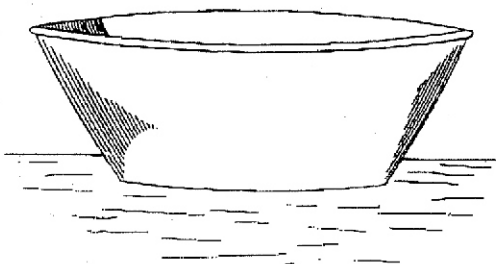
- a) What are the carrying capacities of this graph? **200 and 100**
- b) How many years did this population spend at the first carrying capacity? **2**
- c) During which year did it reach the next carrying capacity? **year 4**
- d) Which carrying capacity is more stable? Why do you think so?  
**The second one because the population is more stable at it (it stayed at the second carrying capacity longer).**

# CARRYING CAPACITY



## THE FULL BUCKET

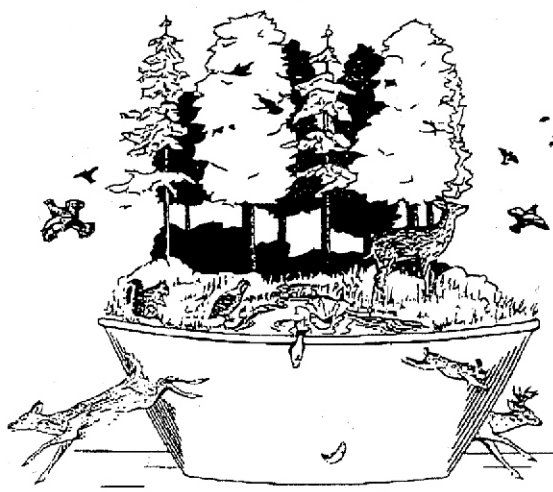
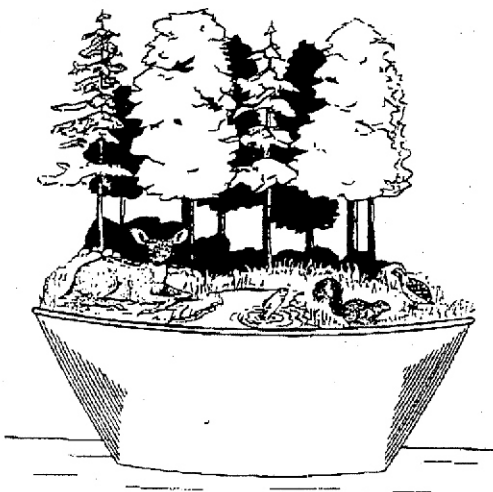
A 2-litre bucket holds only 2 litres.



LIKEWISE:

A given area of land or water supports only the number of animals whose needs for food, water, cover and living space are supplied.

Surplus fish and wildlife from breeding populations or stocking disappear or die.



THIS IS CALLED CARRYING CAPACITY.